Natural Heritage &
Endangered Species
Program

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Natural Community Fact Sheet
Floodplain Forests

Community description

Major River Floodplain Forest, Connecticut River. Nettles under widely spaced trees. Photo: J. Kearsley, NHESP

Floodplain forests are deciduous forested wetland communities which develop next to rivers and streams that flood regularly in the spring. To be considered a true floodplain forest, the forest community must receive annual (or semi-annual) overbank flooding and alluvial silt deposition. In early summer after the spring floodwater's recede, floodplain forests are recognized by their savanna-like forest structure of well-spaced, multi-trunked, tall trees over an open understory and a bare, freshly-deposited silt forest floor. By mid-summer, the floodplain forest is transformed into a lushly vegetated community with abundant woody and herbaceous vines and a tall, thick herbaceous layer dominated by ferns and nettles. All floodplain forest communities in Massachusetts have Silver Maple (*Acer saccharinum*) as the dominant tree taxon, but associated plant species vary depending on the intensity and duration of flooding and on geographic location. Based on these differences, three floodplain forest community types are currently recognized in Massachusetts (Table 1). These three communities have been designated Priority Natural Communities for protection within the Commonwealth by the Massachusetts Natural Heritage & Endangered Species Program (NHESP) due to their distinct vegetation and limited distribution. Undisturbed floodplain forests support a diversity of plants and animals (many of which are only found in floodplain habitats), serve as wildlife corridors, protect the quality of water in adjacent streams by buffering them from upland uses, and serve as important floodwater storage areas. High-quality examples of floodplain forest communities are tracked by NHESP.

Table 1. Floodplain Forest Community Types in Massachusetts

Community Name	Rivers	Sites in MA	Example
Major-River Floodplain Forest, silver maple-cottonwood-stinging nettle association	Connecticut Deerfield Housatonic	20	Fannie Stebbins Wildlife Refuge (East Longmeadow)
Transitional Floodplain Forest	CT River tribs. Housatonic	6	Lower Sawmill River (Montague)
Small-River Floodplain Forest, silver maple-green ash-false nettle-sensitive fern association	CT River tribs. Three Mile, Concord, Ipswich, Assabet	12	Wenham Swamp (Mass. Audubon Ipswich River Sanctuary; Wenham)

The three floodplain forest communities can be viewed as points on a continuum from most severely scoured and well-drained (major-river type) to least severely scoured and poorly drained (small-river type). Transitional Floodplain Forests are intermediate between the two extremes and experience moderate flooding. Differences in soil profiles and vegetation composition make these communities distinguishable in the field; however, as with all natural communities, transitions and mixes do occur. The three community types can occur together as a

floodplain forest community complex at a single site. For example, a forested floodplain on the Connecticut River may be characterized by the major-river floodplain forest community type on the level floodplain and by the small-river floodplain forest community type in poorly-drained depressions within the level floodplain. Other associated community types can be high energy riverbanks on well-scoured, riverine gravel bars; high terrace forests on abandoned river terraces above the active floodplain; and alluvial swamp forests in seasonally-flooded low areas. Vernal pools can also occur within floodplain forest communities in old meander scar depressions.

Environment

All three floodplain forest community types occur within the zone of active flooding of rivers and streams on mineral soils that receive annual silt deposition. They differ in the size of river on which they are found and in the severity of flooding. As their name implies, **Major-river Floodplain Forests** occur along mainstem sections of large rivers (the Connecticut, Housatonic, and Deerfield Rivers in Massachusetts). Soils are predominantly sandy loams without soil mottles and without a surface organic layer. Flooding at these sites is usually severe. An "island variant" of Major-river Floodplain Forests occurs on elevated sections of riverine islands and riverbanks of major rivers where there are high levels of disturbance. **Transitional Floodplain Forests** occur on third-order or smaller tributaries of the Connecticut River, on portions of the Housatonic River, and in depressions within Major-river Floodplain Forests of the Connecticut and Deerfield Rivers. Soils are intermediate in severity of flooding, soil texture, and drainage between major-river and Small-river Floodplain Forests. Soils are either silt loams or very fine sandy loams, and soil mottling is generally present within 60 cm (2 ft.) of soil surface. A surface organic layer is typically absent. **Small-river Floodplain Forests** occur on third-order or smaller tributaries of the Connecticut and Nashua Rivers, on small rivers of eastern Massachusetts where banks are low and overbank flooding occurs (Ipswich, Assabet, Concord, Shawsheen, and Three Mile), and on edges of riverine islands of the Merrimack River. Annual flooding occurs, but the water volume and degree of scour are much less than in Major-river Floodplain Forests. Soils are hydric silt loams and fine sandy loams with soil mottling within the top 60 cm (2 ft.) and sometimes with a surface organic layer.

Characteristic plant species in Massachusetts

Silver Maple (*Acer saccharinum*) is the defining species of all three floodplain forest communities. Depending on the floodplain forest type, silver maple is mixed with varying amounts of other deciduous tree species. Ferns and/or nettles are the most common herbaceous species, and the type of ferns or nettles is a good indicator of the different community types. **Major-river Floodplain Forests** have Silver Maple strongly dominant in the overstory (>60% cover) mixed with lesser amounts of Cottonwood (*Populus deltoides*). American Elm (*Ulmus americana*) and/or Slippery Elm (*U. rubra*) occur in the subcanopy. Shrubs are generally lacking. The herbaceous layer is usually dominated by a 1-2 m (3-6 ft.) tall, dense cover of Stinging Nettles (*Laportea canadensis*). Ostrich Fern (*Matteuccia struthiopteris*) is sometimes abundant. Whitegrass (*Leersia virginica*) is consistently represented, but in low amounts (typically <5% cover). Other common associates are Woodreed (*Cinna arundinacea*) and Jack-in-the-pulpit (*Arisaema triphyllum*). The "island variant" of Major-river Floodplain Forests has similar species, but Silver Maple is not dominant in the overstory and the herbaceous layer is typically strongly dominated by ostrich fern. The overstory is an even mix of Silver Maple, Cottonwood, Sycamore (*Platanus occidentalis*), and American Ash (*Fraxinus americana*), with Box Elder (*Acer negundo*) and Hackberry (*Celtis occidentalis*; on the Housatonic River) common in the subcanopy. Species typical of disturbed areas, such as Staghorn Sumac (*Rhus typhina*) and Bittersweet (*Celastrus orbiculata*), are also common in this variant, as are the vines, Riverbank Grape (*Vitis riparia*) and Virginia Creeper (*Parthenocissus quinquefolia*).

Transitional Floodplain Forests have a vegetation association intermediate between Major-river and Small-river Floodplain Forests. Silver maple is dominant in the canopy, but unlike in major-river forests, cottonwood is typically absent. Similar to small-river forests, Green Ash (*Fraxinus pennsylvanica*) and American Elm are present. A shrub layer is generally lacking; however, saplings of overstory trees are common. Vines are abundant with Hog Peanut (*Amphicarpaea bracteata*) most common. Stinging Nettle is not dominant, but it is present in low amounts (5-15% cover). The herbaceous layer is typically an even mixture of Stinging Nettle, Ostrich Fern, Sensitive Fern (*Onoclea sensibilis*), and False Nettle (*Boehmeria cylindrica*).

As in major-river and transitional floodplain forest types, silver maple is dominant in the overstory of **Small-river Floodplain Forests**, but the understory more closely resembles that of red maple-alluvial swamp forests. Cottonwood and red maple are both typically absent in the canopy of small-river floodplain forest communities. Pin)ak (*Quercus palustris*) is a common canopy associate in the Connecticut River basin, and River Birch (*Betula*

nigra) in the Merrimack River basin. Small-river Floodplain Forests have a more substantial shrub layer than both major-river and transitional types, but less than alluvial swamp forests. The shrub layer consists mainly of Silky Dogwood (*Cornus amomum*) and Buttonbush (*Cephalanthus occidentalis*). There is greater herbaceous plant diversity in Small-river Floodplain Forests than in major-river and transitional types. Sensitive fern and false nettle are most common, and associates include the moisture-loving plants, Water Hemlock (*Cicuta maculata*), Swamp Candles (*Lysimachia terrestris*), and Water Parsnip (*Sium suave*).

State-protected rare plant species in Massachusetts

Six rare plant species occur primarily in floodplain forest communities in Massachusetts: Green Dragon (*Arisaema dracontium*, T), River Birch (*Betula nigra*, WL), Gray's Sedge (*Carex grayi*, T), Cat-tail Sedge (*Carex typhina*, T), Winged Monkey-flower (*Mimulus alatus*, E), and Swamp Dock (*Rumex verticillatus*, T). Two of the species, River Birch and Winged Monkey-flower, are identified as regionally rare taxa for New England meaning that there are fewer than twenty occurrences known from the region. Five of the species (all except River Birch) are protected under the Massachusetts Endangered Species Act. In a statewide inventory and vegetation classification of Massachusetts' floodplain forest communities conducted in 1997, these six rare plant species were found to occur primarily in Transitional and Small-river Floodplain Forest communities. These two floodplain forest community types are less severely scoured and more poorly drained than Major-river Floodplain Forests, but more well-drained than Alluvial Swamp Forests.

E=State Endangered, T=State Threatened, WL=State Watch list, not regulated

Characteristic animal species in Massachusetts

Floodplain forests are insect-rich habitats that attract warblers, thrushes and other songbirds. In particular Yellow-throated and Warbling Vireos, which like to nest in the canopies of riverside trees, are frequently observed in floodplain forest communities. Raptors such as Bald Eagles and Red-shouldered Hawks also use riverbank trees as perch sites. In spring floods, Wood Ducks and Hooded Mergansers like the shady edges of floodplain forests and the interior meander scar pools. Eastern Comma Butterflies feed on elm, nettles and hops, and the shady riverbanks are patrolled by several dragonfly species such as Beaked and Fawn Darners. Where vernal pools occur in floodplain forests, many frog species (such as Leopard, Pickerel and Red Spotted Frogs), American Toads, and Mole Salamanders can be found. Floodplain forests also provide sheltered, riverside corridors for deer and migratory songbirds.

State-protected rare animal species in Massachusetts

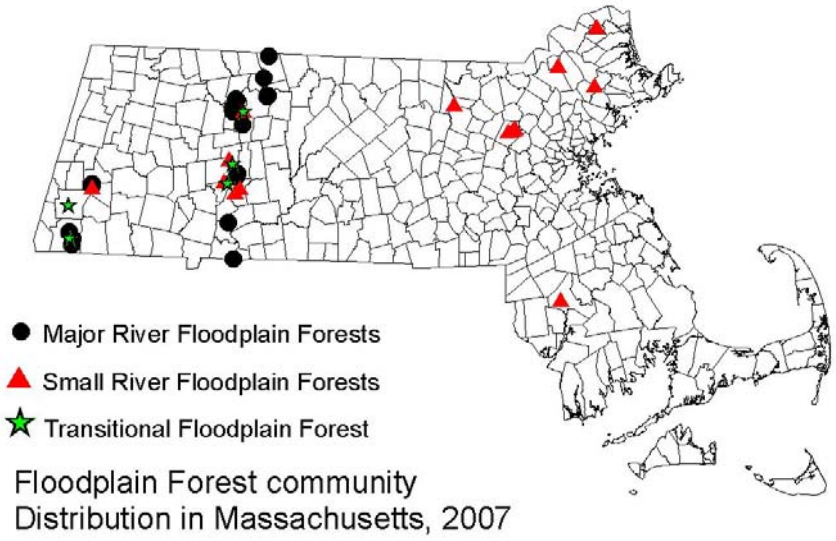
Of Massachusetts' state-protected rare animal species, only the Ostrich Fern Stem Borer (*Papaipema* sp.2; SC) is limited to floodplain forest communities. However, many state-protected rare animal species use floodplain forests as an important component of their habitat. Bald Eagles (*Haliaeetus leucocephalus*; E) use floodplain forests as nesting habitat along the Connecticut River, and they can often be seen perched on floodplain forest trees facing the river. Northern Parula Warbler (*Parula americana*, T) can be found in floodplain forests, particularly where the moss-like lichen, Old-Man's Beard (*Usnea* sp.) occurs. Associated vernal pools provide breeding habitat for Four-toed Salamanders (*Hemidactylium scutatum*; SC) and Eastern Spadefoot Toads (*Scaphiopus holbrooki*; T), and feeding habitat for Wood Turtles (*Clemmys insculpta*; SC) and Blanding's Turtle (*Emydoidea blandingii*; T). Intact floodplain forests also provide shade for streams and rivers, and forest trees and other vegetation help to stabilize riverbanks and limit surface runoff. These functions may be important for maintaining water quality for state-protected rare freshwater mussels, such as the Dwarf Wedgemussel (*Alasmidonta heterodon*; E, FE), Triangle Floater (*Alasmidonta undulata*; SC) and Swollen Wedgemussel (*Alasmidonta varicosa*; E).

SC=State Special Concern, T=State Threatened, E=State Endangered, E, FE= Federally Endangered

Range of Floodplain Forests & Distribution in Massachusetts

Floodplain forests similar in vegetation composition to those found in Massachusetts occur on large rivers throughout the north-central United States. Silver Maple-dominated forests range from New England and New York west to Wisconsin and south to Missouri and New Jersey. In 1997, NHESP conducted an intensive survey of the state's rivers to identify floodplain forest communities and to define the variation in vegetation observed across the range of hydrologic, physiographic and climatic conditions occurring in the Commonwealth. Thirty-eight natural or semi-natural floodplain forest sites ranging in size from 1 to 30 ha (2.5-75 acres) were identified in Massachusetts: 20 were primarily major-river floodplain forest communities, 6 were transitional, and 12 were

small-river types. Of the 38 sites identified, only ten were found to be high-quality examples based on their condition, size, and landscape context. The ten high-quality floodplain forests included five major-river sites (four on the Connecticut River and one on the Housatonic River), one transitional site on the Mill River in Hatfield, and four small-river sites (three in the Connecticut River basin and one on the Three Mile River).



Floodplain Forest community Distribution in Massachusetts, 2007

With the exception of the one site on the Housatonic River, all of the high-quality examples of Major-river Floodplain Forests occur on either public land or privately owned conservation land. Transitional and Small-river Floodplain Forests are less well-protected in Massachusetts. Due to their limited occurrence in the state and the habitat that they provide for state-protected rare plant and animal species, transitional and small-river floodplain forest communities in particular warrant active land protection efforts.

Threats and Management Recommendations

Floodplain forests are considered to be among the rarest and most threatened natural communities in Massachusetts. Due to their high soil fertility and scenic qualities, floodplain forests have largely been converted to agriculture or lost to housing and industrial development. Although land acquisition and conservation restrictions are important ways to protect the remaining examples of floodplain forests in Massachusetts, land protection alone will not maintain these sites as high-quality, natural floodplain forest communities. The natural hydrologic regime that created these special communities and their natural closed-canopy forest structure must be maintained. In the 1997 statewide floodplain forest community inventory, non-native plant species were observed at all floodplain forest sites surveyed, but they appeared to be localized to areas where the canopy was opened, the herbaceous layer was cleared, and the soil was disturbed. Non-native plant species were most abundant along rivers in eastern Massachusetts and on riverine islands and riverbanks of the Connecticut River that are heavily used by campers and boaters for recreation. Openings in the canopy and soil disturbance allow shade-intolerant non-native plant species to establish and spread displacing the native plant species. Japanese Knotweed (*Polygonum cuspidatum*) currently poses the greatest threat to Major-river Floodplain Forests because of its ability to spread rapidly and shade out all other herbaceous plants. There are no truly effective way to eradicate Japanese knotweed once it has established. The best way to avoid its spread is to prevent its establishment by avoiding all clearing and disturbance within floodplain forest areas, particularly on the sandier banks. The non-native plant species, Moneywort (*Lysimachia nummularia*), Forget-me-not (*Myosotis scorpioides*), and Glossy Buckthorn (*Frangula alnus*), are most prevalent in small-river and transitional floodplain forest types, and all efforts should be made to mechanically remove these species.

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